

Promoting Usability in Organizations with a New Health Usability Model: Implications for Nursing Informatics

Nancy Staggers, PhD, RN, FAAN¹, Melanie Rodney, PhD²,

¹Professor, School of Nursing, University of Maryland, Baltimore, MD, USA,

²Usability Researcher, Macadamian, Ottawa, ON, Canada

Abstract

Usability issues with products such as Electronic Health Records (EHRs) are of global interest to nursing informaticists. Although improvements in patient safety, clinical productivity and effectiveness are possible when usability principles and practices are in place, most organizations do not embrace usability. This paper presents a new Health Usability Maturity Model consisting of 5 phases: unrecognized, preliminary, implemented, integrated and strategic. Within each level various aspects are discussed including focus on users, management, education, resources, processes and infrastructure. Nurse informaticists may use this new model as a guide for assessing their organization's level of usability and transitioning to the next level. Using tactics outlined here, nurse informaticists may also serve as catalysts for change and lead efforts to improve the user experience in organizations across industry, academe and healthcare settings.

Introduction

Issues in electronic health record (EHR) usability are now well documented.¹⁻⁵ Stead and Lin⁶ conducted a study of institutions with top-rated EHRs in the United States (U.S.), concluding that none effectively supported clinicians' work design and thought processes. Even more strongly, they stated that EHRs may actually worsen healthcare if future EHRs do not provide better cognitive support for clinicians, that is, if they do not have better usability to support the way clinicians think, do work and make decisions. Stead and Lin addressed physicians and their usability issues, but the same precepts apply to nurses and nurses' work.

The International Organization for Standards (ISO) 9241-11 defines usability as the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.⁷ Although data are available to support return on investment (ROI) and improved patient safety when usability principles and processes are used,⁸ many organizations do not incorporate usability into product purchases, design, deployments or evaluations. Thus, the purpose of this paper is to describe a recently developed organizational usability maturity model and outline its implications for nursing informaticists worldwide.

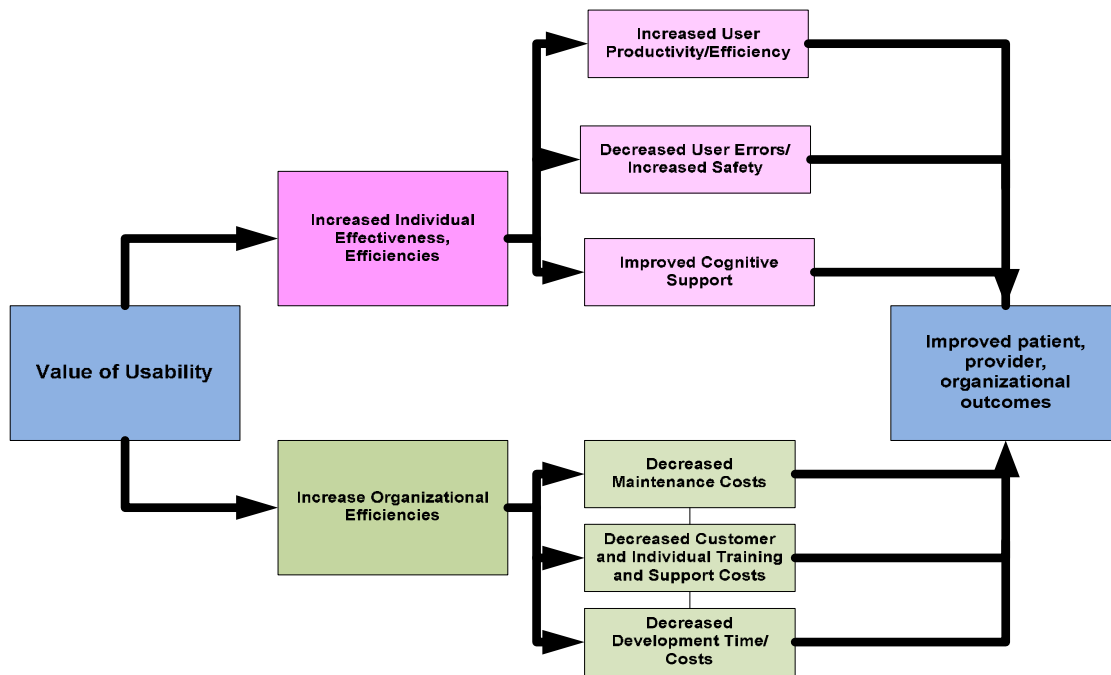
The Value of Usability

Three accepted goals of usability are improved effectiveness, efficiency and user satisfaction (ISO 9241-11).⁷ Tailoring these general goals to healthcare, a group of U.S. and Canadian usability experts developed the following framework (see Figure 1) to list the potential values of improving users' experiences when usability is incorporated into organizations' processes.⁸ Of particular interest are improvements in clinical productivity and safety.

EHRs with poor usability can impact clinician productivity. Outpatient visits had to be reduced from four to three per hour after EHR deployment.⁴ Authors found that clinicians worked several hours more per day because of poor system design, the system lacked support for clinical subspecialties and work-arounds were abundant.² Other researchers completed a cognitive work analysis of the same system in a laboratory setting, finding a large number of average steps for common tasks, high average execution time and a large percent of mental operators.⁴ Usability principles and methods could alleviate major impacts on productivity such as these.

Organizations typically install EHRs to reduce errors. Yet, researchers in Finland surveyed clinicians and found that features and usability issues did not provide support for clinicians' tasks, decision making and error prevention.⁵ In a series of studies, Joan Ash and colleagues outlined the unintended consequences of computerized provider order entry, including errors.⁹ Incorporating usability into organizational processes could address these major detrimental impacts on clinicians. To that end, a usability maturity model is presented for health organizations to use.

Figure 1. The Value of Usability to Health Organizations



A New Health Usability Maturity Model

The authors co-led a Health Information Management Systems Society (HIMSS) Usability Taskforce to develop a Usability Maturity Model.⁸ The new model identifies key elements and milestones involved in successfully integrating usability into a healthcare organization. Each phase allows organizations to identify their current level of usability and also includes guidance to move to the next stage. The five phases with their definition are listed in Table 1 below.

Table 1. Overview of Health Usability Maturity Model Phases

Phase	Title	Definition
1	Unrecognized	Lack of awareness of usability. No practices, policies or resources
2	Preliminary	Sporadic inclusion of usability. Very limited resources
3	Implemented	Recognized value of usability. Small team doing usability
4	Integrated	All benchmarks of usability implemented including a dedicated user experience team
5	Strategic	Business benefit well understood, usability mandated, budget and people part of each year's budget, results used strategically throughout the organization

Detailed descriptions about each phase are available.⁸ Within each phase, various elements are discussed, including:

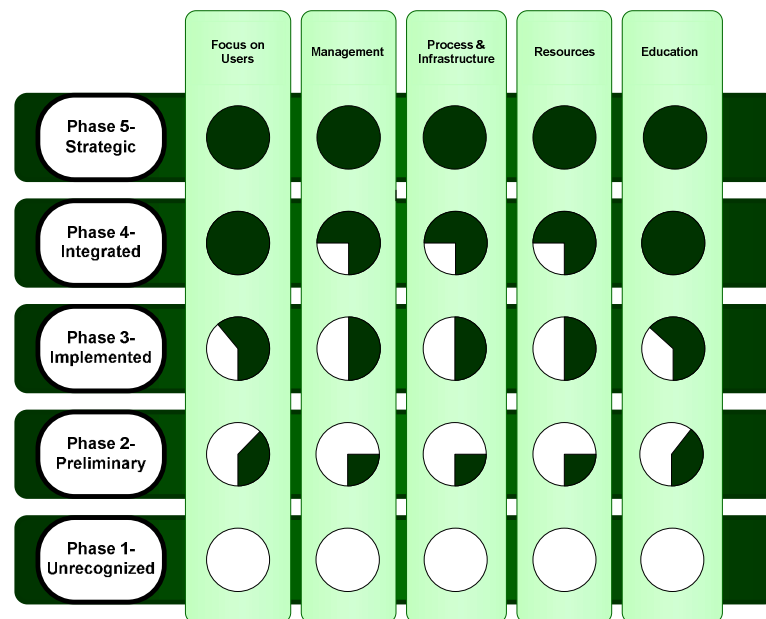
- Focus on users
- Management
- Process and infrastructure
- Resources and
- Education

In Phase 1, unrecognized, the organization is not aware of the impact usability might have across areas. Users experience product issues, including EHR issues, but do not recognize usability as a fundamental issue that might be applied across products and processes. For organizations developing products, individuals may think that incorporating usability methods will delay product release. Thus, there is no focus on users, management is not aware of the potential impact of usability, and no resources, processes or education about usability are expended. Health organizations such as hospitals may even experience active resistance from information technology (IT) groups. By Phase 2, preliminary, organizations include a limited amount of effort towards usability. Typically, a small group may understand usability and apply its principles in selected ways, but no systematic application of principles and practices exists across the organization. The focus on users is uneven with a particular individual receiving attention instead of attention being paid to groups of identified stakeholders. Management may have a beginning awareness about usability but sees it as a limited process for specific areas such as IT product development. Typically, no repeatable usability processes are documented, although a small group may document processes for their own purposes. At Phase 2, preliminary, an organization may have hired an outside usability consultant for support with a specific process, but formal resources are not assigned to projects, and no organizational efforts are available to educate users. There is little formalization of a user-centered design process. The focus is on individual users instead of user groups.

At Phase 3, implemented, a small team of usability practitioners exists. Users are recognized as important, but their needs may still be traded off for other considerations. Typically, a manager exists for a usability team within IT, clinical systems or informatics who has UCD experience. Usability standards and processes are developed to assess a small number of systems and devices (process and infrastructure) and a budget for usability is available. Management is aware that some workflow and staff dissatisfaction with devices and IT systems are, in fact, related to usability. By Phase 4, integrated, all of the benchmarks of a usability program are implemented. The usability group has a recognized mandate and user-focused development is mainstream. Projects have at least one, formally-trained usability expert on them with resources to support usability. All levels of management are aware of usability issues and the need to address them. At Phase 5, strategic, usability is recognized throughout the organization as a strategic activity. The business benefits of usability are well understood and usability activities are mandated and measured for all new products and IT implementations. Purchase processes include usability criteria with standardized processes to evaluate product compliance with requirements. Organizations consider users' needs for any new product or device. Usability practices, processes and policies are standardized across the organization rather than in one specific area and usability savings contribute to organizational revenue, patient safety and cost avoidance. On-going usability training occurs in the organization as well as within usability and IT development teams.

Figure 2 provides a quick guide to the discussion above. The figure shows that as usability concepts mature in organizations, additional foci on users occur, management becomes more keenly aware of the impact of usability, processes and infrastructure are formalized, resources are allocated and educational processes are completed throughout the organization. The components increase gradually to full scope although some mature more slowly. Education and the focus on the user expand early in an organization to help drive the adoption of usability across the remaining organizational elements. Management, processes and infrastructure and resources mature less quickly. While management could lead the institutionalization of usability, a more typical route is for usability experts to be embedded in the organization and adoption occurs by more grassroots mechanisms than top-down mandates. Process and infrastructure develop gradually as the demand for usability is made across products and purchases. Resources parallel the management, process and infrastructure development as the organization devotes fiscal and human resources to usability.

Figure 2. Health Usability Maturity Elements by Phases



Implications for Nursing Informatics

The Usability Maturity Model can serve as a guide for nursing informaticists worldwide. The specific areas for organizational growth are outlined with guidance for transitioning from one level to another until Phase 5 is reached. At minimum, nurses may use the model to assess their organization's current usability maturity and receive guidance about transitioning upward. With most health organizations currently at the unrecognized or preliminary phases, nurses can lead efforts to improve the user experience in important ways. Nurse informaticists are often the ones to recognize EHR and device usability issues with concomitant impacts. One of the ways that organizations become aware of usability is through critical incidents or "wake-up calls."¹⁰ These could be patient safety issues linked to EHR usability or device purchases that greatly impact clinicians' productivity. Nurse informaticists can communicate these cases to key management as organizational wake-up calls. Or, when nurses are in leadership positions such as Chief Nursing Officer or Chief Nursing Informatics Officer, nurses can lead the institutional effort to increase organizational awareness of usability as well as devote increased resources and infrastructure to the cause.

Nurse informaticists can serve as critical change agents for improving the user experience, be internal organizational champions for usability and/or use "individual infiltration tactics" to initiate usability in their organizations. Nursing informaticists often serve as product leads and could incorporate usability processes into their own products' design and development. These kinds of prototypical activities can serve as a template for others especially if nurse informaticists can track the impact of the new products using methods organizational leaders understand, e.g., cost savings, patient safety and efficiency savings or error avoidance. Other processes able to be influenced by nurse informaticists include specifying usability as a standard component of purchase and product evaluation processes.

Informaticists can take advantage of individual infiltration tactics outlined by Rhodes.¹¹ He suggests beginning by understanding what an organization most values, whether it is revenue, safety or employee satisfaction. Then, nurse informaticists can compile evidence toward the most valued elements by assessing usability impacts of products. Infiltration tactics might also include actions that enhance usability: building a usability library or helping teams understand and apply usability methods. Last, allies are important for organizational change, so nursing informaticists can develop allies for this important change in organizational emphasis. Even swaying one key organizational leader can begin an awareness of usability and assist in moving the organization forward.

An assessment tool has been developed to allow healthcare organizations to do a quick self-assessment of their current level of usability maturity. This tool asks a series of questions regarding current usability awareness and practices within your organization. Depending on responses, the tool offers an assessment of the current level of maturity with some suggested actions to move the organization forward. While the tool is not intended to be a definitive assessment of current maturity, (a usability professional should be engaged to conduct a thorough evaluation) it will provide a quick assessment to be used to stimulate discussion and actions to improve usability within any organization. The tool is publicly available online on the HIMSS website at https://www.research.net/s/EHR_Usability_Maturity_Model_Assessment.

Future work on this model could include its testing and validation. One method might be to survey organizations about their usability practices across the range of elements and compare findings with the model. In fact, the model developers are planning a survey of health organizations in the near future. A second method to test the model would be to use an expert panel of usability and informatics experts to refine and/or validate the model.

Conclusions

Usability can be a strategic asset, saving organizations revenue, preventing errors and improving the user experience with products ranging from EHRs to medical devices. This paper presents a Health Usability Maturity Model outlining five phases of usability maturity for health organizations ranging from unrecognized to strategic. In each of the five phases, attention to the following attributes increase: focus on the user, organizational management, resources, processes and infrastructure and education. Nurse informaticists are in key positions to improve the user experience in their facilities by using the model as a guide. Specific tactics for nurse informaticists include leading efforts to incorporate usability into their organizations, following infiltration tactics, including usability in purchasing and/or development processes and creating liaisons with key leaders to facilitate change.

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